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BULLETIN
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TORREY BOTANICAL CLUB.

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A new Species of *Listera*, with Notes on other Orchids.

BY THOMAS MORONG.

LISTERA BOREALIS, n. sp.—Stems very delicate, 3'-5' high, glabrous below, glandular pubescent and with long, silky, scattered hairs among the inflorescence, sheathed by 2 obtuse, membranous scales at the base; roots thickened, somewhat fleshy; leaves oval, slightly sheathing, obtuse at the apex, 4"-8" long, 2"-4" broad, entire, bearing on the surface a few silky hairs, otherwise very glabrous. Raceme 2 or 3 flowered. Bracts scarcely 1" long, much shorter than the pedicels. Sepals and petals nearly equal, linear, obtuse, about 2" long. Lip 4"-5" long, 2" broad at the obtuse apex, ciliolate above; apical lobes very obtuse, 1" long, the intermediate tooth obsolete; basal lobes $\frac{1}{2}$ " long, very obtuse. Column slightly incurved, $1\frac{1}{2}$ " long. Flowers greenish-yellow, the lip with a purplish middle, and purplish nerves radiating into the apical lobes. The flowers and column, as well as the leaves and upper stem bear the silky hairs mentioned, some of which are 2" long.

Collected by Miss E. Taylor at Fort Smith, Slave River, Hudson Bay Territory, June 28, 1892.

Self-fertilization.

Darwin seems inclined to think, if he does not absolutely assert, that all orchids are unable to fertilize themselves, and that appears to be the prevalent view to-day. That insect agency is imperatively needed in many cases is doubtless true. The structure of the floral organs in a large number of species is such that it is clearly impossible for the pollen to reach its own stigma without artificial aid. The rostellum often very effectually interposes between the anther cells and the stigmatic cavity. There is, however, more than one species in which the means of self-fertilization are

provided, and plenty of proof that this does take place. The plants have two strings to their bow, and one or both may be used as a means of securing offspring, as in many *Naiadaceæ* both propagating buds and seeds are produced, so that if one method fails the other may be employed. It is not always true that the pollen is so firmly agglutinated that its grains can be separated only by a considerable force. In *Leptorchis*, for instance, the pollen masses are very loosely granular, without caudicles, glands or connecting threads, and the grains are easily detached by the wind or rain, and therefore liable to be conveyed to their own stigma by such agitation. What serves to show that in this genus self-fertilization is common is the fact that our two species produce an abundance of ripe capsules which is not generally true in other genera where insect agency is absolutely necessary. *L. lilifolia* frequently occurs in our Northern woods and nearly every plant that I have collected in the latter part of the season is well furnished with fruit. This is equally the case with the several species of *Achroanthos*. In several of the genera which are destitute of caudicles and glands, I have had occasion to observe the pollen dust scattered over the lip, column and stigma precisely as I have seen the pollen of willows scattered over the inflorescence, suggesting an analogous distribution. Another very interesting method of self-fertilization is related by Sir Jos. Hooker in a paper which he read before the Royal Society of London, in 1854. The plant which he has under review, is *Listera ovata*, a British species very like our *L. cordata*. He found that if the rostellum is touched or irritated when the pollen is ripe a sort of explosion occurs and two white viscid masses are instantly protruded, one from each side of the apex, which coalesce and attach themselves to the bases of the pollinia, and draw them out of their cases. The pollen, he says, is by this means broken up, and the grains fall over the edge of the rostellum upon the stigmatic surface. Here is a case which, while not at all preventing the plant from being fertilized in the ordinary way by insects, clearly shows that the means of self-fertilization is specially provided for. Now in the allied genera, *Gyrostachys*, *Peramium*, *Epipactis*, *Cathea*, *Arethusa* and *Pogonia*, while no irritability of this kind has so far been observed, yet the caudicular discs are attached so firmly to the back

of the rostellum that by bending it downwards the pollinia are drawn out of their cases and broken up. Supposing an insect crawling upon the rostellum or any other weight to perform this act, some of the pollen grains are pretty sure to be thrown upon their own stigmas. In the three first mentioned of these genera, at least, we find the species maturing an abundance of fruit, which in a measure confirms the idea that self-fertilization often takes place. But there is stronger evidence of the fact of self-fertilization in several species of *Habenaria*. In *H. tridentata*, the rostellum, instead of being as in most species of *Habenaria*, a solid shield interposing between the anther cells and a deep stigmatic cavity lying far underneath, is split into three club-shaped columns, standing one on each side of the cells and one between them, rising to a level with the cells. The upper and inner surfaces of the two lateral columns are viscid and evidently stigmatic. The pollen is powdery and within easy reach of these contiguous stigmas. Curiously enough, too, when the anther cells dehisce, these stigmatic columns contract on their inner side, and may be said actually to lean over and help themselves to the pollen. As a matter of fact the columns are known often to be penetrated even in the unopened flower by pollen tubes (Gray's *Man.* Ed. 6, page 506), and they have been found still more common in the mature flower. This structure occurs to a greater or less degree in the allied species, *H. integra* and *H. nivea*. With such facts as these before us, we should be cautious how we limit all Orchidaceous species to a single mode of fertilization.

Nomenclature.

Calopogon, R. Br. in Ait. Hort. Kew. Ed. 2, v. 204 (1813).

This name is antedated by *Cathea*, Salisbury in Trans. Hort. Soc. i. 300 (1812), and by *Limodorum*, L. Gen. Pl. Ed. 2, 829 (1742), as well as by *Helleborine*, Martyn (1736). Kuntze, *Revisio Generum Plantarum*, 665, adopts the last name as having the right of priority, but, taking as our starting point in nomenclature, the first edition of Linnæus' *Species Plantarum*, 1753, we cannot follow him. *Limodorum* must be dropped also, because Ludwig (*Definitiones Generum Plantarum*, 1737) had anticipated the Linnæan name of 1742 by adopting *Limodorum* from Tournefort, in application to a different genus from that of Linnæus. Therefore, we must drop

both *Calopogon* and *Limodorum* and apply Salisbury's name to the Northern species, which will accordingly stand as follows:

CATHEA TUBEROSA (L.).

Limodorum tuberosum, L. Sp. Pl. 950 (1753).

Cathea pulchella. Salisb. Trans. Hort. Soc. i. 300 (1812).

Calopogon pulchellus, R. Br. in Ait. Hort. Kew. Ed. 2, v., 204 (1813), and later authors.

Listera, R. Br.—Kuntze has adopted Rafinesque's name "*Diphyllum*" as anterior to *Listera*. The word originally misspelled "*Diphryllum*," and several times subsequently in Rafinesque's published writings, Kuntze seems to think should be retained in this form on that account, but Rafinesque himself spells it correctly in his "*Herbarium Rafinesquianum*," and there seems to be no good reason why an evident misspelling should not be corrected. It is, however, inadmissible as a substitute for *Listera*, as the description given by Rafinesque in Rep. N. Y. Med. Repos., 2nd Hexade v., 357, (1808), clearly shows. He speaks of his plant as having "2 interior petals . . . bifid; lip acute, *entire*; capsule *filiform*," which is entirely inapplicable to any of our published species. There is preserved in the library of the New York Academy of Science a curious old volume of proof plates of various species drawn by Rafinesque, among which is a drawing of this plant, the figure of which corresponds exactly to the author's description. What plant was meant it is impossible to say, but it is evidently not a species of our *Listera*. Consequently the name of Brown holds good.

Spiranthes, Richard, 1818, must give way to *Gyrostachys* of Persoon, 1807, as has been well shown by Kuntze, and our species known as *Spiranthes* should be classed under the older name.

Probably Kuntze is also correct in displacing *Liparis*, Richard 1818, by *Leptorchis*, Du Petit-Thouars, 1809, but I have not been able to get hold of the work cited by Kuntze (Nouv. Bull. Soc. Phil. 314-19) and cannot verify his date.

Goodyera R. Br. (1813) is antedated by *Orchiodes*, Siegesbeck, 1737 (Supp. 13) and by *Peramium* of Salisbury (Trans. Hort. Soc. i. 301) 1812. Under our rules *Peramium* must be substituted for *Goodyera*.

Epipactis.—The history of this name is a curious one, showing

how tangled is the synonymy when we come to search for priority. Kuntze in the volume already referred to cites Ludwig's name *Limodorum* as the original under his system of nomenclature, but that acute author has made a palpable mistake, for Ludwig adopts the name from Tournefort and a reference to Tournefort's description and figure shows very clearly that he means a spurred plant belonging to the genus *Orchis*, and Ludwig himself (Def. Gen. Pl. Ed 2, 213) describes it as having a spur, which *Epipactis* has not. Linnæus in his description of *Orchis*, Gen. Pl. n. 681, correctly cites Tournefort's *Limodorum* as the same as his *Orchis*. Linnæus' *Serapias* (Gen. Pl. n. 683), which equals *Helleborine*, Tournefort, included several genera, among them our *Epipactis*, the original name being retained by Bentham and Hooker for several Mediterranean species. Haller in 1742 (Enum. Stirp. i. 277) constituted the genus *Epipactis*, followed by Crantz in 1769, Allioni in 1785, and others. Richard afterwards still farther divided the genus, calling the plants without glands *Cephalanthera*. So that we have the three genera, *Serapias*, *Epipactis* and *Cephalanthera*, each of them legitimately applied to the species now bearing those names.

The species of *Epipactis* occurring in Northeastern North America, should be designated as follows:

E. VIRIDIFLORA (Hoff.)

Serapias viridiflora, Hoff. Deutsch. Fl. ii. 182 (1800).

E. latifolia, var. *viridiflora*, Irm. in Linnæa xvi., 451 (1842).

E. viridiflora, Reich. Fl. Exc. 134 (1830).

E. Helleborine, var. *viridens*, Asa Gray, Bot. Gaz. iv. 206 (1879).

E. Helleborine, A. Gray, Man. Ed. 6, 504, (1890) not Crantz.

Dr. Gray in the volume of the Botanical Gazette referred to, noticing the recent discovery of the plant at Syracuse, New York, states that it is "exactly the *E. viridiflora* of Reichenbach, well figured in the Icones Floræ Germanicæ which peculiar as it seems to be, is reduced by Irmisch to a variety of *E. Helleborine*." Singularly enough, he at the same time adopts Crantz' varietal name (*E. Helleborine*, var. *viridans*.) Probably this was because he regarded the plant as essentially equivalent to the *E. latifolia* of Europe, which Linnæus had named *Serapias Helleborine*, var. *latifolia*, but the two are quite dissimilar, and Reichenbach had good reason for separating them. Our plant differs from that in having narrower,

longer and more tapering sepals, a lip destitute of tubercles or callosities or lobes on either the upper or lower part, all of which characters occur in the European *E. latifolia*. So decided is the difference upon close inspection that I have no hesitation in following Reichenbach and adopting Hoffman's name, *E. viridiflora*, notwithstanding the fact that the specific name is not well chosen to indicate the color of the flowers.

Three stations are now known for this plant. In addition to those near Syracuse and at Buffalo New York, another has recently been found at Toronto, Canada.

Microstylis.—Nuttall's section of *Malaxis* known under this name, as has been shown by Prof. Greene, is antedated by Rafinesque's name, *Achroanthus*, and our Northern North American forms become:

A. MONOPHYLLA (L.), Greene, Pitt. ii., 183 (1891).

Ophrys monophylla, L. Sp. Pl. 947 (1753).

Microstylis monophylla, Lindl. Bot. Reg. t. 1290 (1829).

A. UNIFOLIA (Mx.), Raf. Med. Rep. 2d Hex. v. 352 (1808).

Malaxis unifolia, Mx. Fl. ii. 157 (1803).

Microstylis ophioglossoides, Nutt. Gen. ii. 196 (1818).

Habenaria ciliaris and *H. blephariglottis*.—So far as I can see, the specific difference between these two forms can hardly be maintained. According to Michaux, who seems to have been the first to mention the white colored plant, it is merely a white variety of *H. ciliaris*, and this judgment appears correct. Dr. Asa Gray, in the Annals of the Lyceum of Natural History of New York, iii., 231, says that the two species "grow in similar situations and frequently in company, and are not readily distinguished except by the color of the flowers. But, as Prof. Hooker justly remarks in *H. ciliaris*, the lip is more thickly fringed, and the upper petals are likewise fringed; whereas in *H. blephariglottis* these are quite naked." Numerous specimens of the two species in the Columbia College Herbarium show that the lip varies in both species from loosely to thickly fringed, and is the same identically in shape. If it were the fact that in the one the petals are fringed and in the other not, that might serve to distinguish them, but it is now well known that the petal of *blephariglottis* are commonly as much fringed as in *ciliaris*. It is only in *blephariglottis* var.

holopetala, Torr., that the petals are entire, and I find many specimens of this species which show on the same plant all grades of petals from entire to cut-toothed and fringed. So that no dependence can be placed on the constancy of this character.

The very confusion into which authors have fallen in regard to these two species is significant. Willdenow, the author of the name *blephariglottis* (Sp. Pl. iv. 9, 1805), observes "very similar to *ciliaris*, but the narrow lip, the length of the highest petal and slightly ciliate. The corolla seems to be yellow." Dr. Torrey, in his Compendium of 1826, briefly describes them, and the description of either applies perfectly well to the other, except that the one is called "bright yellow" and the other "pure white." Hooker (Exot. Bot. t. 87), calls the var. *holopetala* "*Habenaria blephariglottis*," and Lindley names it "*Platanthera holopetala*," upon which Torrey (Fl., N. Y., ii. 277), who gives altogether the best description of the two species, remarks: "I certainly agree with Sir William Hooker in considering *P. holopetala* of Lindley as only a variety of this (*blephariglottis*) species, which again scarcely differs from the following (*ciliaris*) except in the white flowers. Lindley has even a white variety of *P. ciliaris*." Chapman reduces it to *H. ciliaris*, var. *blephariglottis*.

Lindley, in his Gen. and Sp. of Orchids, seems to have mixed matters badly, evidently knowing the species imperfectly. After converting *Orchis blephariglottis*, Willd., into *Platanthera holopetala*, he describes *Platanthera ciliaris* under two varieties, viz., var. *a.* with yellow flowers, which he attributes to Alabama, and var. *β.* with white flowers, which he attributes to Canada. It is to this that Torrey refers. Lindley could distinguish his *holopetala* from *ciliaris* only by its entire petals, which, as I have shown, is an inconstant character. So far as color goes, even if color alone were a sufficient ground for specific distinction, which it is not, I find in the Herbarium on sheets of undoubted *blephariglottis* labels from different collectors marked, "flowers, lemon yellow," and "flowers, lemon yellow, varying to *ciliaris*."

A careful comparison of the flowers in the two forms, as shown in the large collection at Columbia College, renders the following arrangement the most satisfactory:

Habenaria ciliaris (L.), R. Br. in Ait. Hort. Kew. Ed. 2, v. 194 (1813).

Orchis ciliaris L. Sp. Pl. 939 (1753). Mx. Fl. ii. 156 (1803).

Platanthera ciliaris, Lindl. Orchid., 292 (Aug. 1835).

Var. ALBA (Mx.).

Orchis ciliaris, var. *alba*, Mx. Fl. ii. 156 (1803).

O. blephariglottis, Willd. Sp. Pl. iv. 9 (1805).

Platanthera blephariglottis, Torr. Fl. N. Y. ii. 277 (1843).

Habenaria ciliaris, v. *blephariglottis*, Chap. Fl. 460 (1860).

Var. HOLOPETALA (Lindl.).

Platanthera holopetala Lindl. Gen. and Sp. Orch. 291 (Aug., 1835).

Habenaria blephariglottis, Hook. Exot. Fl. t. 87 (1825).

P. blephariglottis, v. *holopetala*, Torr. Fl. N. Y. ii. 277 (1843).

In this connection it is a matter of interest to note an irregular or monstrous form of *H. ciliaris* which was collected in the vicinity of New York during the last summer by Mr. Henry Ogden. The lip is either entire or imperfectly fringed and obovate, instead of being as in the normal form, long and deeply fringed and long ovate. In some of the flowers the anther cells are 4, in pairs, 2 parallel cells on one side, and 2 on the other; and in some cases there is another cell besides, back of one of the others. In some instances the lateral tubercle or swelling of the clinandrium is mounted upon one of the cells, or partly displaces its lower portion. Most of the flowers are entirely destitute of spurs. Some have spurs as long as the ovary, and a few have spurs not a quarter as long as the ovary.

This species frequently produces only a leaf the first year, flowering the second year. As a result, the collector is often disappointed upon going to a locality and finding no flowers where he found an abundance the year before. I have detected a similar habit in other species.

Habenaria flava.—Dr. Asa Gray examined the Herbarium of Gronovius containing the plant upon which Linnæus founded this species, and ascertained beyond a doubt that it is the same as that which has since been called *Habenaria virescens*. (See Am. Jour. Sci. & Arts, xxxvii. 307.) The history of its synonymy is a good illustration of the manner in which some plants under the old methods of nomenclature have travelled about from pillar to post. Dr.

Gray, in the article referred to, gives an outline of the synonymy up to 1840. It appears as *O. virescens*, Willd. Sp. Pl. 4, 37 (1805); as *Habenaria herbiola*, R. Br. in Ait. Hort. Kew. Ed. 2. v. 193, (1813); as *O. flava* and *O. fuscescens* in Pursh (1814), and *O. bidentata* in Elliott (1824). It was subsequently named *Platanthera herbiola* by Lindley in his Gen. et. Sp. Orchid., *H. herbiola* and, as a synonym, *H. virescens*, by Sprengel in his Systema, and then *Platanthera flava* by Dr. Torrey, Bot. N. Y., and by Dr. Gray in the first edition of his Manual. Had Dr. Gray abided by the opinion expressed in his article in the American Journal of Science, in which he says "the specific name is certainly not happily chosen for a plant of which Clayton observes "*floribus obsolete luteis*," but it must nevertheless be retained," all would have been well. In spite of this sound dictum, however, in his Manual, Ed. 5, 499, (1867) he rebaptizes the plant as "*Habenaria virescens*, Spreng," adopting Sprengel's synonym. This he does, apparently, because "the flowers are not yellow," though why he should have disregarded Sprengel's name *H. herbiola*, and the still older *H. herbiola* of R. Br. is not clear. In the sixth edition of the Manual the same name, "*virescens*, Spreng," is continued. Besides all this topsyturvy, the species has had several other aliases. It is easy to see why our plant synonymy is in such a state of confusion when we find authors following their own caprices in substituting new names for old ones. Stability can be secured only by adhering firmly to the principle of priority, no matter what we may think of the appropriateness of the first specific name. The species should therefore be named:

Habenaria flava, (L.) Gray, Am. Jour. Sci. and Arts, xxxvii, 308 (1840).

Orchis flava, L. Sp. Pl. 942, (1753),

Cypripedium.—A single change in the names of our North American species should be noted.

C. reginæ, Walt. Fl. Car. 222 (1788).

C. album,—Ait. Hort. Kew. iii. 303 (1789).

C. spectabile,—Salisb. Trans. Linn. Soc. i. 78. t. 3, f. 3 (1791), and later authors.